Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

SSS26-P14 Room:Convention Hall Time:May 19 18:15-19:30

Depth distribution of the Moho discontinuity beneath Kyushu, Japan, as derived from receiver function analyses

Yuki Abe[1*], Takahiro Ohkura[1], Kazuro Hirahara[1], Takuo Shibutani[2]

[1]Graduate School of Science, Kyoto Univ., [2]DPRI, Kyoto University

In Kyushu, Japan, the crust is intricately moving and deforming under the influence of the subducting Philippine Sea plate, faulting of the Median Tectonic Line, and back-arc spreading. How those affect the movement and deformation of the crust is still controversial. Crustal thickness is affected by strain of the crust and flow of the mantle, which are keys to understanding tectonics and volcanism. We estimated the depth distribution of the Moho beneath Kyushu with receiver functions (RFs).

We used teleseismic waveform data obtained at stations of Hi-net established by National Research Institute for Earth Science and Disaster Prevention, and stations of the J-array established by Japan Meteorological Agency, Kyushu Univ., Kagoshima Univ., and Kyoto Univ. We calculated RFs with the extended-time multitaper method (Shibutani et al., 2008, BSSA). We stacked the RFs with a 3-d velocity structure estimated by Matsubara et al. (2008, Tectonophys.) and constructed an E-W cross-section at every 0.1 degrees of latitude from 31^{o}N to 34^{o}N.

We tried to estimate the depth distribution of the Moho beneath Kyushu from the cross-sections. Beneath the region south of 33^{o}N and east of 131^{o}E, the depth distribution was not estimated because we did not detect RF peaks corresponding to the phases converted at the Moho.

In the region between 31^{o}N and 32^{o}N, the Moho exists shallower than 35 km. In the region between 32^{o}N and 33^{o}N, the Moho exists deeper than 35 km beneath the part south of the Futagawa-Hinagu faults, and it exists at 30-35 km in depth beneath the part north of the faults. In the region between 33^{o}N and 34^{o}N, the Moho exists deeper than 35 km beneath the part west of 130^{o}E and northeastern part of the area between 130^{o}E and 131^{o}E, and it exists at 30-35 km in depth beneath the part east of 131^{o}E and southwestern part of the area between 130^{o}E and 131^{o}E.

In the region east of 130.3^{o}E, the Moho depth beneath the part south of 32^{o}N is 5 km shallower than that beneath the part north of 32^{o}N. Takayama and Yoshida (2007, JGR) analyzed GPS data observed in 1998-2002, and indicated that the part south of 32^{o}N displaces toward southeast and extends in SE-NW direction, and the part north of 32^{o}N does not largely displaces toward southeast. They interpreted that back-arc spreading and retreat of the slab cause the crustal extension. The crustal thinning would be caused by the crustal extension.

In the region west of 131^{o}E, the Moho is uplifted 5-10 km in a belt-like area parallel to the Futagawa-Hinagu faults. One side of the belt corresponds to the Futagawa-Hinagu faults and the Beppu-Shimabara graben exists in the area. The width of the belt is 70-80 km. Based on gravity data, Tada (1993, Mem. Geol. Soc. Japan) indicated that the Moho is uplifted at most 10 km in the region between 25 km north and 25 km south of Shimabara peninsula. Our finding of the uplift of the Moho is corresponding to the results of Tada (1993), and mantle upwelling can exist there.

Keywords: Kyushu, Moho, receiver function